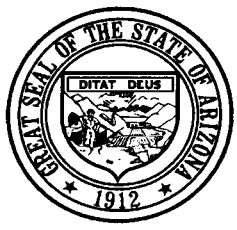
CHAPTER

3

Water Use Characteristics



3.1 INTRODUCTION

This chapter describes how water is currently used within each of the three water demand sectors in the Prescott Active Management Area (AMA). The three sectors are agricultural, municipal, and industrial. Anticipated growth patterns for each sector are discussed, based on past trends in water use and development. Sources of water supply that have been used over time and trends in the use of these supplies are detailed. Some discussion of expected supply source utilization in the future is included. This chapter also outlines the major issues or conditions which impact not only the sources of supply used, but the overall demand within the sector as well. Finally, a water budget of current conditions, relative to the AMA goal, is presented which illustrates the need for continued conservation and augmentation efforts during the third management period in order to improve progress towards achieving the AMA goal by 2025.

Figure 3-1 shows the trend in municipal, industrial, and agricultural water use within the Prescott AMA from 1990 through 1997. In Figure 3-1, municipal use includes total water use reported to the Arizona Department of Water Resources (Department) by municipal water providers (see Chapter 5), as well as water use by exempt wells. Municipal use for Figure 3-1 does not include groundwater withdrawals from individually owned, small wells (exempt wells, ≤ 35 gallons per minute, for domestic or stock watering purposes). However, estimates of demand by exempt wells have been included in the water budgets as demand. Agricultural water use in Figure 3-1 includes surface water and effluent deliveries by the Chino Valley Irrigation District (CVID) to individual farms within the AMA for all years except 1990, when groundwater alone was used to meet agricultural water needs. Agricultural use includes total water used for all farms within the AMA who are required to report their water use to the Department. Industrial use in Figure 3-1 includes groundwater withdrawn pursuant to a non-irrigation grandfathered groundwater right or permit for industrial purposes (see Chapter 6), such as irrigation of school grounds or golf courses, or for sand and gravel operations. Municipal use, as described above, accounted for 60 percent of the reported water use in the Prescott AMA in 1997, while agricultural use comprised 37 percent of the reported use and industrial use made up the remaining 3 percent. These figures do not represent all of the water being used within the AMA since owners of small farms (≤10 acres) and small wells (≤35 gallons per minute pump capacity) are not required to report their water use to the Department. In addition, use of effluent to irrigate fields or turfed areas is sometimes under reported. The total maximum volume of effluent available to the CVID prior to 1999 was 300 acre-feet. Finally, the CVID is not required to report its deliveries of surface water to farms within the district, but farmers who possess both groundwater and surface water rights annually report water received from the CVID. However, the total volume of surface water available to the CVID is included in the water budgets as supply.

Figure 3-2 shows the total groundwater, surface water, and effluent use by municipal, industrial, and agricultural water users for the Prescott AMA between 1990 and 1997. Table 3-1 shows 1990 through 1997 water use by sector within the Prescott AMA. The data in Table 3-1 are represented in Figure 3-1.

3.2 OVERVIEW OF THE PRESCOTT AMA

3.2.1 Demographic and Economic Characteristics

Based on disaggregated data from the Arizona Department of Economic Security, the Department estimated that 74,633 persons resided within the Prescott AMA in 1997. Population in the AMA is projected to increase to 147,680 persons by 2025 (ADWR and ADES, 1997). Major communities within the Prescott AMA include Prescott, Prescott Valley, Chino Valley, and Dewey-Humboldt. However, a significant percentage of Prescott AMA population resides outside of these local jurisdictions.

FIGURE 3-1
1990-1997 TOTAL WATER USE BY SECTOR
PRESCOTT ACTIVE MANAGEMENT AREA

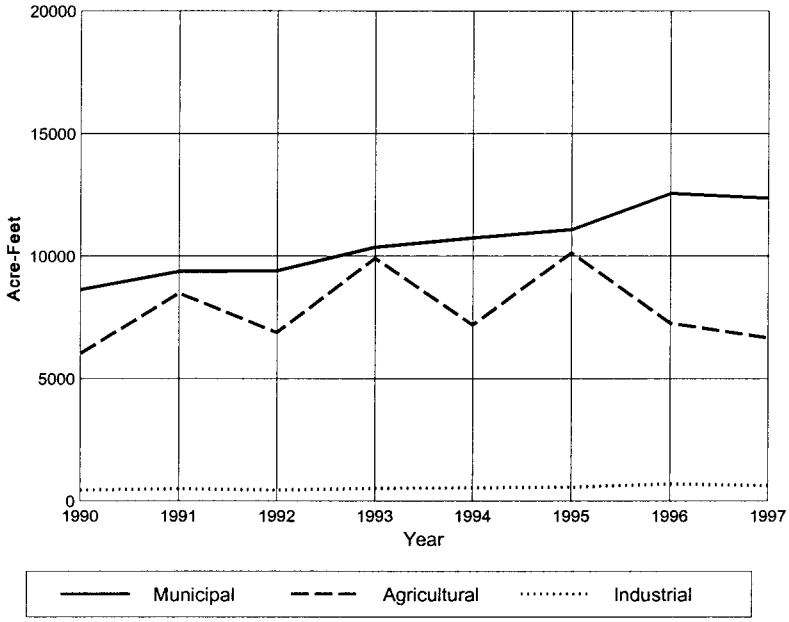


FIGURE 3-2
1990-1997 TOTAL WATER USE BY SOURCE
PRESCOTT ACTIVE MANAGEMENT AREA

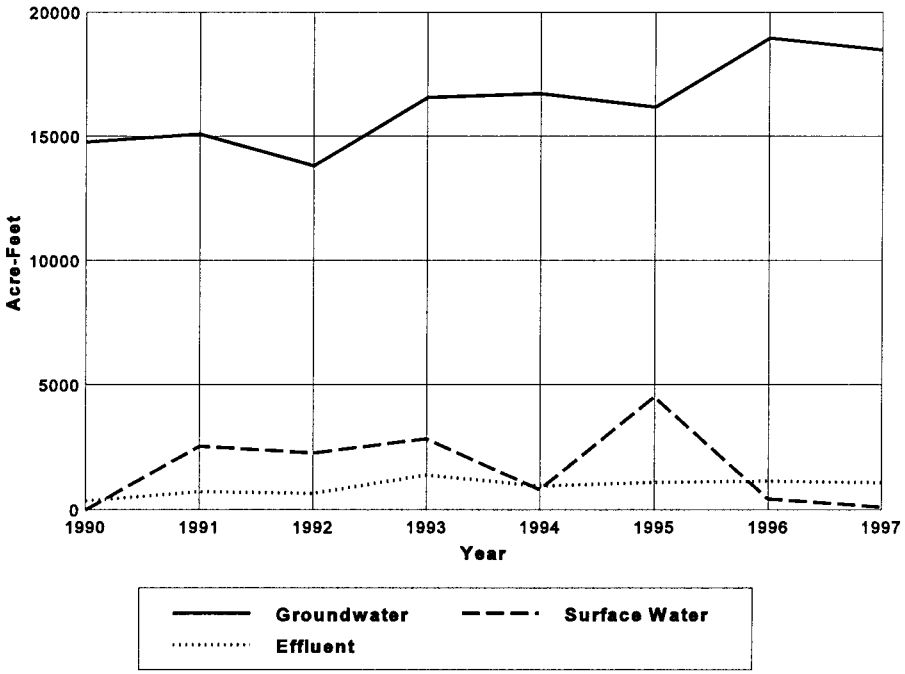


TABLE 3-1
1990-1997 WATER USE BY SECTOR
PRESCOTT ACTIVE MANAGEMENT AREA

Year	Municipal Use (acre-feet)	Agricultural Use (acre-feet)	Industrial Use (acre-feet)	Total Use (acre-feet)
1990 Totals	8,633	6,932	444	16,009
Groundwater	8,289	6,032	444	14,765
Effluent	344	0	0	344
Surface Water	0	900	0	900
1991 Totals	9,379	9,391	486	19,256
Groundwater	8,667	5,943	486	15,096
Effluent	712	0	0	712
Surface Water	0	3,448	0	3,448
1992 Totals	9,406	7,790	443	17,639
Groundwater	8,756	4,613	443	13,812
Effluent	650	0	0	650
Surface Water	0	3,177	0	3,177
1993 Totals	10,372	10,809	500	21,681
Groundwater	9,595	6,460	500	16,555
Effluent	777	611	0	1,388
Surface Water	0	3,738	0	3,738
1994 Totals	10,745	8,087	533	19,365
Groundwater	10,044	6,134	533	16,711
Effluent	701	253	0	954
Surface Water	0	1,700	0	1,700
1995 Totals	11,091	9,217	555	20,863
Groundwater	10,303	5,316	555	16,174
Effluent	788	302	0	1,090
Surface Water	0	3,599	0	3,599
1996 Totals	12,571	8,164	688	21,423
Groundwater	11,635	6,629	688	18,952
Effluent	936	205	0	1,141
Surface Water	0	1,330	0	1,330
1997 Totals	12,366	7,572	626	20,564
Groundwater	11,594	6,260	626	18,480
Effluent	772	302	0	1,074
Surface Water	0	1,010	0	1,010

Perhaps the most notable recent demographic trend has been the substantial increase in Prescott Valley's population, which has already surpassed its projected growth rate. Each of the population centers in the Prescott AMA have been enormously successful in attracting new residents to the region's favorable climate and physical environment. In addition to year-round residents, a large seasonal population base has developed. Commercial growth and light industry have expanded to meet this rise in residential consumer demands.

3.2.2 Government/Institutional Setting

Other agencies and organizations, in addition to the Department, are also involved in water resources management through planning and zoning, flood control, water planning, wastewater management and water quality management.

The Groundwater Users Advisory Council (GUAC) is a locally based advisory body comprised of a mixture of public and private representatives from the Prescott AMA. Established for each AMA, the GUAC provides a public forum for local review and commentary of Department activities as they relate to the administration of the respective AMA's management goal. County and municipal governments, along with the CVID and the Yavapai-Prescott Indian Tribe, also play key roles in both the GUAC and other local water management initiatives. In January 1999, the Yavapai County Board of Supervisors established the Yavapai County Water Advisory Committee. This committee has the mission to review information on water issues of a regional nature as may be provided by the Verde Watershed Association and the Groundwater User's Advisory Council of the Prescott AMA, and other water related organizations or individuals, and report its findings and recommendations on a quarterly basis to the Board of Supervisors. The Board of Supervisors has agreed to act as the facilitator for coordinated efforts related to regional water issues. The Northern Arizona Council of Governments (NACOG), the regional body responsible for overseeing the interests of the communities in northern Arizona, reviews the Prescott AMA's activities within the context of a larger, regional perspective.

The Arizona Department of Environmental Quality (ADEQ) develops and enforces water quality guidelines. The Arizona Corporation Commission (ACC) regulates the rate structures of private water companies.

Federal entities whose activities may overlap with state and local jurisdictions include the United States Environmental Protection Agency (EPA), which administers the Endangered Species Act (ESA), the Safe Drinking Water Act (SDWA) and the National Pollutant Discharge Elimination System (NPDES) among other environmental programs. Prescott National Forest lands limit to varying extent municipal expansion depending on its proximity to these forest lands. Collection and analysis of hydrologic data is performed at the federal level by the United States Geological Survey (USGS), which often works in conjunction with Department monitoring efforts. A large volume of data collection would not have been possible without assistance from the USGS, which cooperates with Department water management efforts by collecting and analyzing hydrologic data within the Little Chino and Upper Agua Fria Subbasins. The Army Corps of Engineers, the Bureau of Reclamation, and several arms of the Department of Agriculture represent other federal entities which play significant roles in water related matters, where they assist the state and local individuals in improving water efficiencies and flood control.

The following sections describe more fully water use and trends in each of the three demand sectors within the Prescott AMA.

3.3 AGRICULTURAL WATER USE CHARACTERISTICS

The agricultural sector is comprised of farm acreage that was actively irrigated with groundwater from 1975 to 1980 and lands in the CVID. Agricultural lands that used groundwater to irrigate crops during

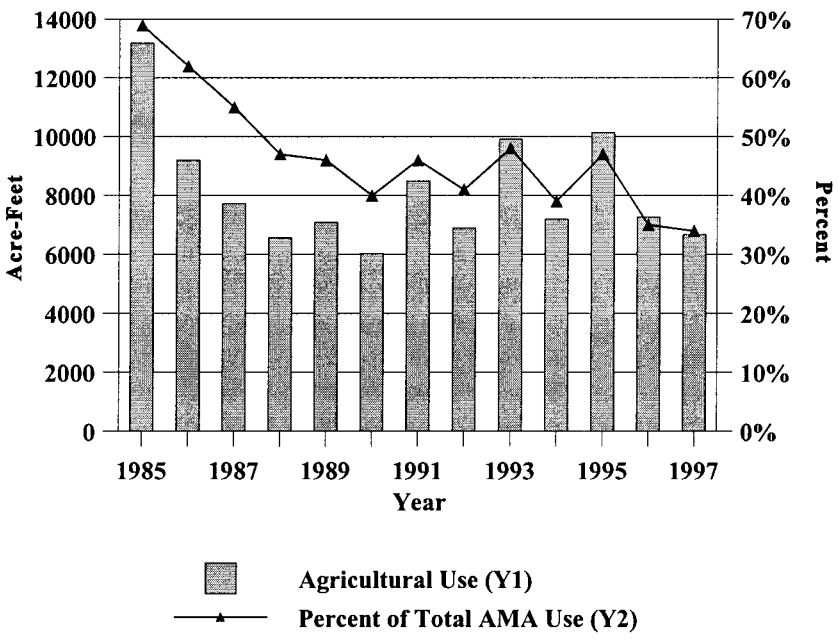
this time period were awarded an Irrigation Grandfathered Right (IGFR) by the Department. Water use pursuant to these rights is required to be reported to the Department if the right is over ten acres. Other lands are irrigated within the Prescott AMA exclusively with surface water or effluent recovered within the area of impact. Persons who use only surface water or effluent recovered within the area of impact for irrigation purposes are not required to report their annual water use to the Department unless they also possess an IGFR and use both surface water and groundwater in any given calendar year.

3.3.1 Agricultural Demand

The agricultural sector used approximately 7,572 acre-feet of water from all sources in 1997. This water use represents 37 percent of the total reported water use within the Prescott AMA in 1997. In 1997, the agricultural sector accounted for 34 percent of the total Prescott AMA groundwater use reported by holders of groundwater rights and permits. Figure 3-3 shows historical agricultural water use from 1985 through 1997 and the sector's percentage of overall reported water use in the Prescott AMA. Surface water data was unavailable for 1985 through 1989 and was not included in the total use for those years.

There are currently a total of 85 Irrigation Grandfathered Rights regulated for compliance with conservation requirements in the Prescott AMA. These rights total about 5,600 irrigation acres with a Second Management Plan final annual allotment of about 19,000 acre-feet per year. Approximately 320 acres not holding IGFRs are irrigated with surface water annually.

FIGURE 3-3
HISTORIC AGRICULTURAL WATER USE
PRESCOTT ACTIVE MANAGEMENT AREA



The Department regulates all IGFRs two acres or larger within AMAs. In 1994, IGFRs 10 acres or less and not part of an integrated farming operation of ten acres or more were deregulated as a result of the Small Rights Bill. IGFRs in this "small farm" category are no longer required to report annual water use and comply with water duty limitations. Small farms make up over half of the IGFRs in the Prescott AMA, but only account for approximately 2 percent of the total use.

During the second management period, the Department designated Areas of Similar Farming Conditions (ASFCs) within all five AMAs for the purpose of evaluating irrigation water use characteristics and conservation potential. These areas were designated based on cost and delivery of irrigation water. In the Prescott AMA, farms within the CVID make up an ASFC and include about 35 farm units. The cost of surface water delivered by the CVID is significantly less than pumped groundwater, which is the primary water source used by farms outside the CVID. Figure 3-4 is a map showing the location of IGFRs and the CVID boundary within the Prescott AMA.

In 1998 the City of Prescott successfully negotiated an intergovernmental agreement with the CVID to acquire the surface water rights, held by the CVID, through a sever and transfer action. Under this agreement the City will make recovered treated effluent available, from wells located within the CVID, for irrigation of district lands until the quantity of effluent reserved for CVID is used up. Beginning in year 1999 surface water will no longer be available to the district. The agreement requires the City to make 1,500 acre-feet of recovered effluent available annually as first water use for the CVID. Groundwater can be used to supplement those CVID lands having IGFRs as a second use water. The maximum amount of groundwater which can be used is equal to the highest amount of groundwater pumped in any previous single year consistent with conservation requirements, or 25% of the annual groundwater allotment.

The vast majority of agricultural surface water use occurs inside the CVID area, although 900 acre-feet per year has been historically diverted from Del Rio Springs for irrigation use. Some of the farms located within the CVID possess their own IGFRs in addition to being members of the district. These farms are sometimes referred to as dual rightholders. Some farms in the CVID do not possess IGFRs. These farms may be irrigated only with surface water or effluent recovered within the area of impact supplied by the CVID.

For groundwater management purposes, it is also useful to examine agricultural demand within the Prescott AMA by groundwater subbasin. The Little Chino Subbasin contains the majority of the agricultural water demand within the AMA both currently and historically.

As discussed in other chapters, agriculture as an industry is on the decline and will soon disappear as a major water user in the AMA. By the end of the Third Management Plan the demand for water by agriculture will consist of specialized agriculture and U-Pick-Em farms. That demand will be insignificant.

3.3.1.1 Crop Mix

Forage crops, such as alfalfa, oats, wheat grass, orchard grass, and fescue, are predominantly grown in the Prescott AMA. Other crops grown throughout the area include both grain and sweet corn, wheat, sod, vegetables, and annual pastures. Methods of applying water to crops in the AMA include the use of flood irrigation systems, sprinkler irrigation and drip irrigation. Table 3-2 shows crop types and acreages planted from 1987 through 1997 for IGFRs in the Prescott AMA. Approximately 300 acres in the CVID, not holding IGFRs, and irrigated using surface water when it was available, were planted to small grain crops or annual grass hay (oats) crops.

3.3.1.2 Cropping Patterns in 1995

About 1,700 acres of land associated with IGFRs were cropped in 1995, out of a potential 5,600 acres. This represents a 30 percent land utilization rate. It is expected that a decline in cropped acres will occur through the years, decreasing to less than 1,000 acres by the year 2010. This is expected to occur due to a number of factors including additional urbanization and the transfer of CVID surface water rights in combination with 1,000 acres associated with IGFRs to the City of Prescott.

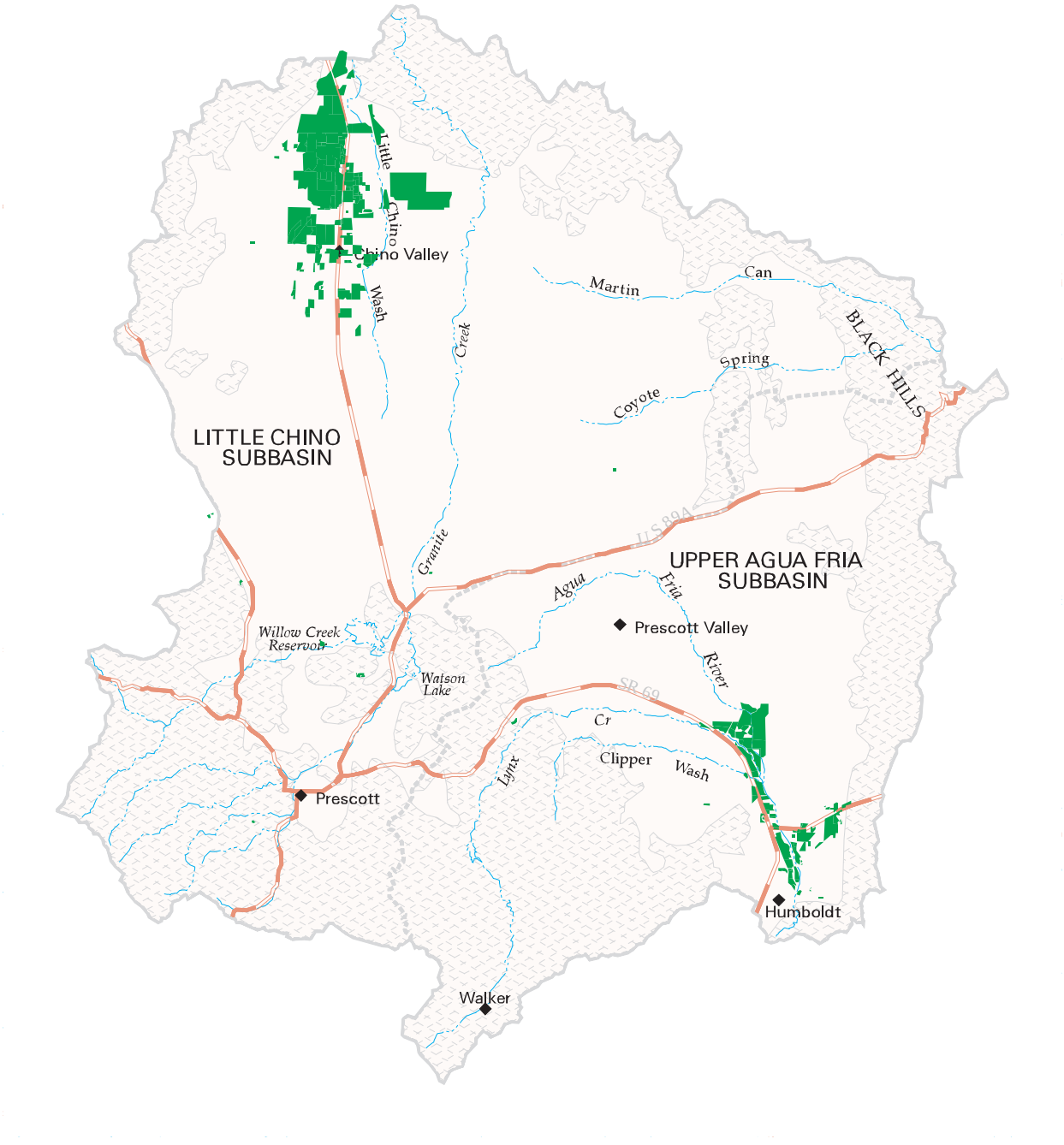


Figure 3- 4

IRRIGATION ACREAGE

SOURCE:
Arizona Department of Water Resources
Geographic Information System

3.3.1.3 Agricultural Water Use Rate

In 1995, the average application rate of water used for IGFR agricultural purposes was 3.17 acre-feet per acre for the Prescott AMA. This figure does not include those CVID lands that are irrigated solely with water delivered by the district. This IGFR water application rate has fluctuated over the years 1987 through 1997 from a high of 4.94 acre-feet per acre in 1989, to a low of 2.57 acre-feet per acre in 1992. Part of this may be due to the fluctuating use of irrigation depending on weather conditions. In some years, the majority of precipitation occurred during the winter months and was not as useful to agriculture as the precipitation which occurred during the spring and summer. These figures do not reflect the fluctuating use of water by farms using CVID water exclusively. Water use by CVID only farms also fluctuated primarily due to the availability of water within Watson and Willow Lakes. In wet years, the CVID delivered significant volumes of surface water. In dry hot years when CVID surface water was limited, many farmers deficit irrigated or did not crop at all. Many of those with IGFRs felt it was too expensive to pump groundwater to irrigate annual crops.

TABLE 3-2
PLANTED ACRES BY CROP TYPE FOR IGFRs 1987-1997
PRESCOTT ACTIVE MANAGEMENT AREA

Crop (in acres)	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Oats	22	64	5	37	37	37	51	73	59	8	8
Sorghum	0	0	0	22	22	36	22	22	0	0	0
Wheat	83	30	0	0	0	35	33	25	47	57	143
Corn	0	0	0	160	160	160	160	160	160	160	160
Alfalfa	549	364	297	124	132	111	155	130	140	172	182
Turf	0	0	33	33	33	33	33	33	33	33	33
Perm. Pasture	1,036	976	906	1,015	1,045	1,197	1,183	1,136	1,113	1,339	1,339
Sw. Corn	53	53	53	53	53	73	53	73	59	101	101
Vegetables	46	75	101	92	72	72	72	72	57	78	78
Grapes	3	20	3	3	3	1	19	19	0	8	8
Plums	5	10	10	9	10	10	10	9	11	0	0
Christmas Trees	23	22	23	22	2	2	2	2	0	0	0
Flowers	0	0	0	5	1	2	7	0	0	0	0
Nursery	0	0	0	22	22	23	0	0	0	0	0
TOTAL	1,820	1,614	1,431	1,597	1,592	1,792	1,800	1,754	1,679	1,956	2,052
Use Rate (AF/acre)	3.61	3.43	4.94	3.78	3.73	2.57	3.59	3.50	3.17	3.39	3.05

AF = acre-feet

3.3.2 Agricultural Supply

Groundwater made up 83 percent of the total agricultural water supplies utilized in 1997. The agricultural sector is dependent upon groundwater to meet the majority of the demand as seen in Table 3-3. For the years 1985 through 1989, the figures in the table below do not include deliveries of surface water and effluent by the CVID to those farms without an IGFR. Surface water was used almost exclusively within the CVID. The CVID delivered both surface water and effluent for agricultural use in the Little Chino Subbasin. The CVID had impoundment rights to divert and store surface water flow from Granite Creek and Willow Creek. Surface water from Granite Creek is stored in Watson Lake Reservoir and surface water from Willow Creek is stored in Willow Creek Reservoir. These reservoirs have a combined storage capacity of 11,498 acre-feet when water levels are at their peak. In recent years, a small volume of effluent, pursuant to a contract with the City of Prescott, had been commingled with the surface water and delivered through the CVID main canal to members of the district for irrigation use.

3.3.3 Agricultural Growth Trends

Because the Groundwater Code (Code) generally prohibits new land from being brought into agricultural production within an AMA, the agricultural sector within the Prescott AMA cannot grow in land area. Moreover, increased urbanization of the AMA is resulting in the conversion of farmland into residential subdivisions and commercial establishments. This trend is expected to continue until only a few family farms and one or two commercial farms remain in active production within the AMA. Most of the agricultural land expected to urbanize will probably go out of production by the time the third management period concludes (the year 2010). For more detail on growth trends and future projections, see Chapter 11. The declaration by the Department that the AMA is no longer in safe-yield will accelerate the rate at which agricultural lands go out of production. This action will occur as developers seek out alternative water supplies.

3.3.3.1 Past Agricultural Demand

Agricultural water use declined dramatically in the early 1980s. However, agriculture has remained a significant water user in the Prescott AMA, as is the case in most AMAs throughout the state.

3.3.3.2 Current Agricultural Demand

Since agricultural use is primarily centered within the Little Chino Subbasin and the overall agricultural demand has been greatly impacted by the availability of surface water for delivery by the CVID, agricultural use has varied based on weather conditions and the water level in Watson and Willow Lakes. With the sale of CVID surface water rights to the City of Prescott, water use for the growing of crops is expected to decline.

3.3.4 Agricultural Flex Credits

The flex account provisions (A.R.S. § 45-467), which became effective in 1987, allow a farmer to accumulate debits up to 50 percent of the farm's annual groundwater allotment, or to accumulate flex credits for the unused portion of the annual allocation. Flex credit accruals are not limited and can be used at any time in future years. Accrued credits offset a debit. However, if a debit exceeds the 50 percent level, compliance action is taken. An additional provision (House Bill 2340), which became effective in 1991, allows right holders within irrigation districts that delivered groundwater to transfer flex credits accumulated during the preceding calendar year from one IGFR to another. However, this provision did not apply to agricultural water users within the CVID because the CVID did not deliver groundwater.

TABLE 3-3
AGRICULTURAL WATER USE BY SOURCE
PRESCOTT ACTIVE MANAGEMENT AREA

Year	Groundwater Use (acre-feet)	Surface Water Use (acre-feet)	Effluent Use (acre-feet)	Total Use (acre-feet)
1985	11,988	2,100	–	14,088
1986	8,242	1,850	–	10,092
1987	6,572	2,041	–	8,613
1988	5,534	1,923	–	7,457
1989	7,062	912	–	7,974
1990	6,032	900	0	6,932
1991	5,943	3,448	0	9,391
1992	4,613	3,177	0	7,790
1993	6,460	3,738	611	10,809
1994	6,134	1,700	253	8,087
1995	5,316	3,599	302	9,217
1996	6,629	1,330	205	8,164
1997	6,260	1,010	302	7,572

Legislation adopted in 1998 allows an IGFR holder outside of an irrigation district (including farms within the CVID) to buy or sell flex account credits to other farmers. The flex account provisions were intended to provide farmers with sufficient flexibility to address varying climatic conditions and take advantage of changing agricultural market conditions.

Since A.R.S. § 45-467 became effective, right holders in all AMAs have accumulated flex credits in amounts far greater than had been expected. Table 3-4 displays the cumulative credits and debits for IGFRs in the Prescott AMA. Debits accrued are associated with only a few farms.

The total Second Management Plan second interim allotment associated with all active IGFRs in the Prescott AMA is about 25,000 acre-feet per year. This allotment will be effective through the year 1999. As a result of changing the conservation requirement to reflect a change in irrigation system efficiency from 50% to 75% when calculating IGFR annual allotments, the Second Management Plan final allotment, which becomes effective in the year 2000, is approximately 19,000 acre-feet for the total of all IGFRs in the AMA. The total amount of credits accumulated through 1995 are approximately 158,100 acre-feet.

There are several factors that contribute to flex credit accumulations. Many IGFRs are no longer irrigated because of economic conditions. An IGFR holder that does not irrigate during the year receives a credit for the entire annual allotment. Some IGFRs have been taken out of production, but have not been officially retired. Another contributing factor to flex credit accumulations was the Federal set-aside program that required cooperating farmers to leave a portion of their farm fallow. As a result of the set-aside program, farms typically leave the least productive ground out of production which yields higher water use efficiency on the acreage cropped. These programs received very little participation in past years

and have been significantly reduced in recent years under the federal farm programs. Many farmers have implemented water conservation practices (i.e. sprinkler systems, ditch lining, and irrigation scheduling) that have increased the overall efficiency of their on-farm water use. Also, water duties (annual allotments) are based on the historical crop mix (between 1975 and 1980) and the highest number of acres irrigated in any one year during that five year period, which may have reflected a higher water demand (consumptive use) than what is currently being produced.

TABLE 3-4
AGRICULTURAL FLEXIBILITY ACCOUNTS*
PRESCOTT ACTIVE MANAGEMENT AREA

AMA	Irrigation Acres (>10 acres)	SMP2 Allotment	Total Use (1995)	Total Credits 1987-95	Total Debits 87-95
Prescott	5,600	25,000	9,800	158,100	8,000

*All numbers are rounded to the nearest 100. Allotment, Total Use, Total Credits, and Total Debits values are in acre-feet. IGFRs affected by the Small Rights Bill are excluded. Total Use includes all groundwater, surface water, and effluent used for agricultural irrigation.

It is probable that most of the accumulated agricultural flex credits will never be used since they can only be used pursuant to an IGFR. The distribution of accumulated flex credits ranges widely across the AMA's IGFRs. Some IGFRs have accumulated many credits while others have accumulated very few.

3.3.5 Retirement of Irrigation Rights

It is expected that most IGFRs in the Prescott AMA will eventually be retired. Some will be converted to Type 1 rights to be used for industrial development. Others will be retired as the lands they are appurtenant to are subdivided into residential and commercial development. It is expected that the largest active IGFR (675 acres) in the Prescott AMA will be retired to urban use by the year 2000. The average annual groundwater use of this right alone represents one-third of the total agricultural groundwater usage in the Prescott AMA. Moreover, agricultural lands within the CVID boundary are anticipated to go out of production as a result of the transfer of CVID surface water rights to the City of Prescott. Additional IGFRs may go out of production under groundwater mining conditions, as grandfathered rights can be extinguished in order to obtain groundwater credits as part of proving an assured water supply.

3.4 MUNICIPAL WATER USE CHARACTERISTICS

Municipal water providers serve water pursuant to service area rights. This type of water right allows a municipal provider to serve current and future demands as the water service area grows. Municipal water use includes water delivered to residential customers for indoor and outdoor watering. Water delivered to non-residential users such as industrial facilities, commercial properties, and construction use is also categorized as municipal water use.

3.4.1 Demand

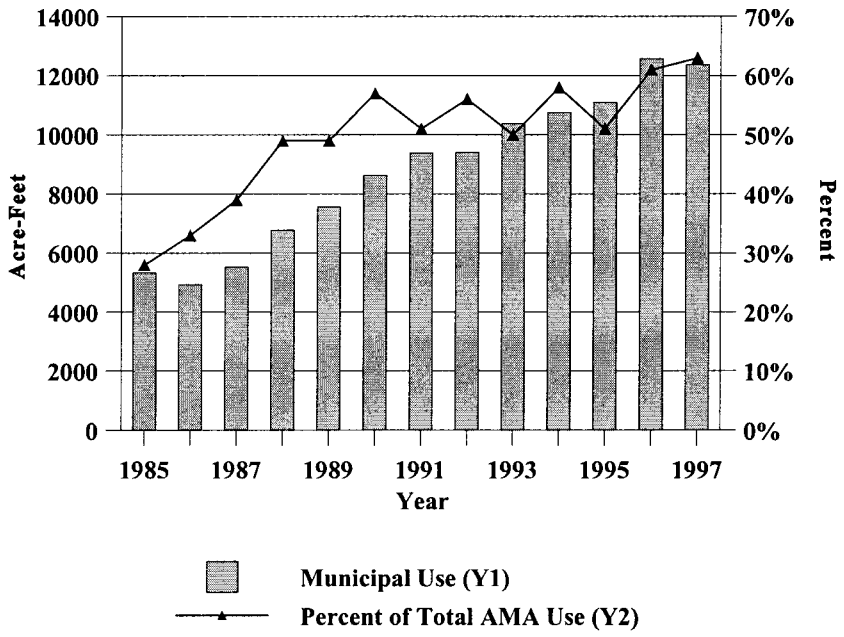
The total reported groundwater use by municipal providers in the Prescott AMA during 1997 was 11,594 acre-feet. This represents 63 percent of the overall AMA groundwater usage in 1997. Including deliveries of effluent to golf courses, the total municipal water use in 1997 was 12,366 acre-feet. This equals 60 percent of the total AMA water use from all sources in 1997. Figure 3-5 shows municipal water use by year from 1985 through 1997 in the Prescott AMA and the percent of the total AMA water use that was comprised of municipal use in those years.

These figures do not include pumpage by private individual wells for domestic use with pump capacities of 35 gallons per minute or less (nor do the total use figures for 1985 through 1989 include effluent delivered by the City of Prescott for golf course watering).

Two municipal water providers supply the majority of potable water for use within the Prescott AMA: the City of Prescott and Prescott Valley Water District, formerly Shamrock Water Company. In 1997, these two providers supplied 9,862 acre-feet of groundwater or 85 percent of the total municipal groundwater demand.

Small municipal providers supplied the remainder of reported municipal usage. Table 3-5 shows groundwater usage by the two large municipal providers and the sum of small municipal provider groundwater usage from 1985 through 1997 in the Prescott AMA. The following section discusses water use patterns within the two large municipal provider service areas and historic water use by small municipal providers in the Prescott AMA.

FIGURE 3-5
HISTORIC MUNICIPAL WATER USE
PRESCOTT ACTIVE MANAGEMENT AREA



3.4.1.1 Large Municipal Providers

Large municipal providers use more than 250 acre-feet of water annually and are regulated for compliance with a specific conservation requirement (usually a Total Gallons Per Capita Per Day rate requirement) designed to encourage efficient water use within their service areas (see Chapter 5). There are two large municipal providers in the Prescott AMA, the City of Prescott and Prescott Valley Water District. Table 3-6 provides more detailed information on the large municipal water provider per capita use rate for the Third Management Plan base year (1992-1995 average). Figure 3-6 shows the location of municipal provider service areas in the Prescott AMA.

TABLE 3-5
GROUNDWATER DEMAND BY PROVIDER TYPE, 1985-1997
PRESCOTT ACTIVE MANAGEMENT AREA

Year	City of Prescott (acre-feet)	Prescott Valley Water District (acre-feet)	Small Providers (acre-feet)	Total Municipal Groundwater Demand* (acre-feet)
1985	4,125	854	344	5,323
1986	3,628	1,021	280	4,929
1987	4,056	1,183	286	5,526
1988	5,025	1,418	328	6,771
1989	5,668	1,569	319	7,556
1990	5,014	1,795	279	7,088
1991	5,221	1,854	335	7,410
1992	5,056	2,019	364	7,439
1993	5,633	2,232	464	8,329
1994	5,656	2,615	493	8,764
1995	5,664	3,010	463	9,136
1996	6,352	3,439	537	10,328
1997	6,509	3,353	521	10,383

* Does not include groundwater withdrawn by exempt wells

TABLE 3-6
1992-1995 AVERAGE SERVICE AREA CHARACTERISTICS
LARGE MUNICIPAL PROVIDERS
PRESCOTT ACTIVE MANAGEMENT AREA

	City of Prescott	Prescott Valley Water District
Total GPCD Usage Rate	155	134
Residential GPCD Usage Rate	92	94
Non-Residential GPCD Usage Rate	49	29
Lost %	9%	9%

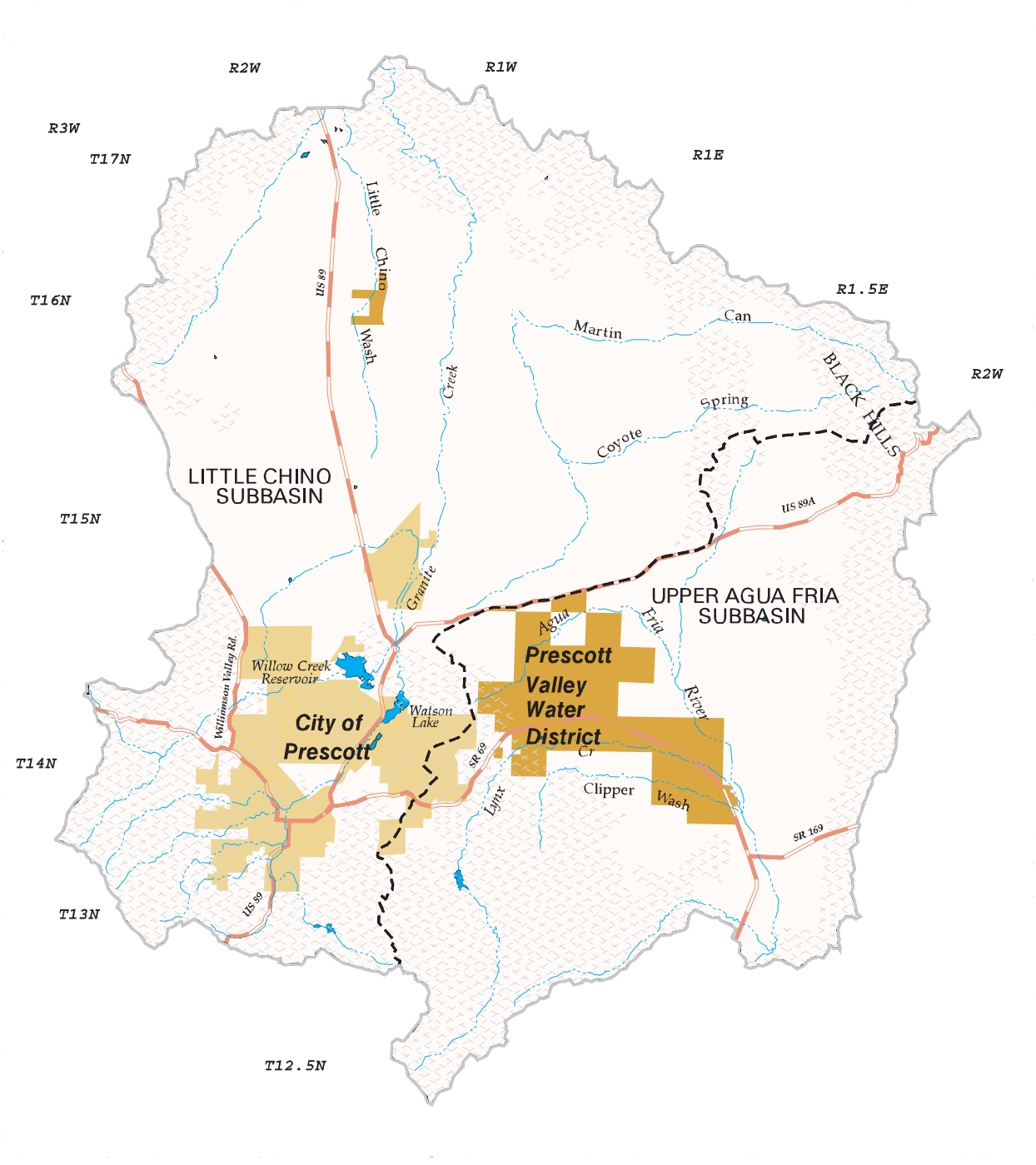


Figure 3- 6

Water Provider Service Areas

ORIGINAL SOURCE
Arizona Department of Water Resources
Geographic Information System

City of Prescott

Total water use has been steadily increasing since 1985, with the City of Prescott supplying 4,125 acre-feet of water in 1985, compared to 6,509 acre-feet in 1997. Figure 3-7 shows City of Prescott water use for the years 1985 through 1997. However, the proportion of residential to non-residential use in the Prescott service area has remained extremely stable over time, with non-residential deliveries consistently accounting for about 35 percent of the total water delivered. Nearly all of the water demand within the Prescott water service area is met with groundwater. The exceptions to this are two 18-hole golf courses at Antelope Hills that are provided effluent for turf watering.

Prescott Valley Water District

Prescott Valley Water District provides water to the Town of Prescott Valley, the Prescott Country Club, and several adjacent residential areas. Water use by this municipal provider increased dramatically between 1985 and 1997. In 1985, a total of 854 acre-feet of water was used. By 1997, the demand had increased to 3,353 acre-feet. This increase is due to increases in both residential use and non-residential use. All demand in the Prescott Valley Water District water service area is met with groundwater. Figure 3-8 shows Prescott Valley Water District water use for the years 1985 through 1997.

Population and water use data by category show that the residential gallons per capita per day (GPCD) rate in the Prescott Valley Water District's service area has increased with increased residential population. And, in contrast to the Prescott service area, the Prescott Valley Water District's proportion of non-residential deliveries has fluctuated over time as new, sometimes large, non-residential users are added to the service area.

3.4.1.2 Small Municipal Providers

Small municipal providers use 250 acre-feet of water or less annually. They are required to use water efficiently, but are not assigned a specific GPCD requirement. There are currently 17 active small municipal providers in the Prescott AMA. One of these, Triangle Development Corporation, is a former large municipal provider that was legislatively de-emphasized in 1994 pursuant to the Small Rights Bill. In 1991, the Prescott Valley Water District began delivering water through a master meter to the Triangle service area. However, the population and water demand for Triangle has not been added to the Prescott Valley Water District system for those years where the Prescott Valley Water District provides water to Triangle. Since the Triangle system experiences a high rate of lost and unaccounted for water, the Prescott Valley Water District has been reluctant to permanently incorporate the Triangle system into the Prescott Valley Water District water service area.

Prescott Valley Water District is providing water to the Triangle system on an emergency and temporary basis. It is not known at this time whether the Triangle system will be upgraded, sold, or one day permanently included in the Prescott Valley Water District's service area.

There are five general categories of small municipal providers: (1) municipalities, (2) well co-operatives, (3) mobile home parks, (4) private water companies regulated by the Arizona Corporation Commission, and (5) institutional-type providers (small providers are not eligible for the institutional provider program), in addition to other miscellaneous providers. In the Prescott AMA, most small providers are either small water companies, mobile home parks, or co-operatives.

FIGURE 3-7
CITY OF PRESCOTT WATER USE 1985-1997
PRESCOTT ACTIVE MANAGEMENT AREA

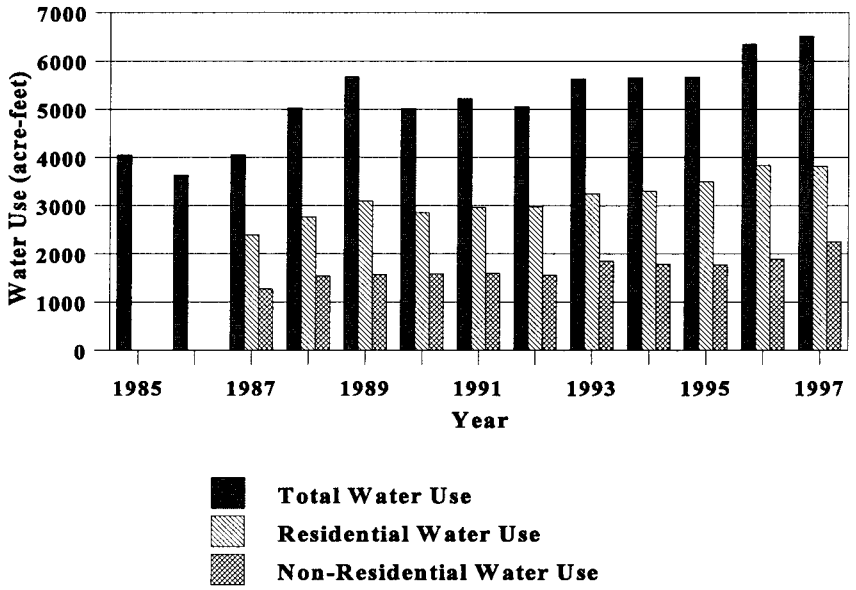
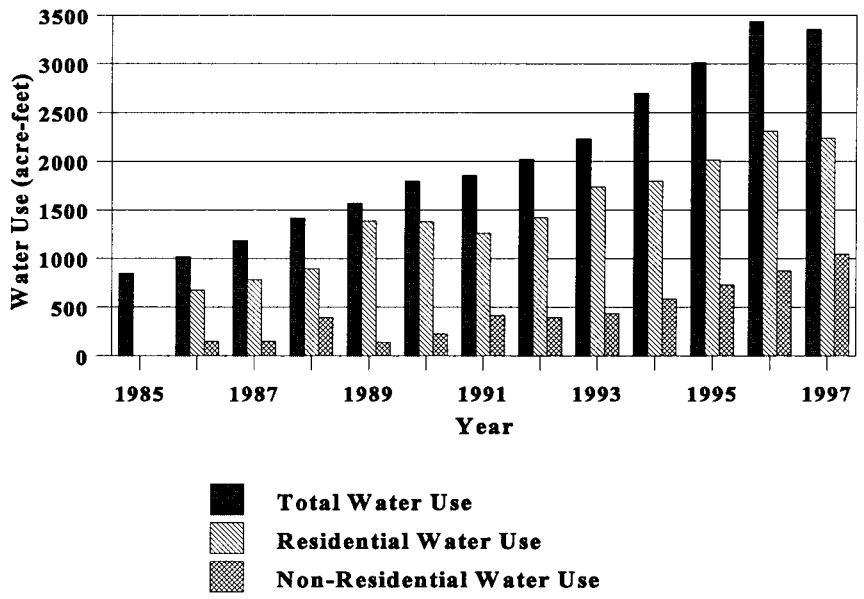
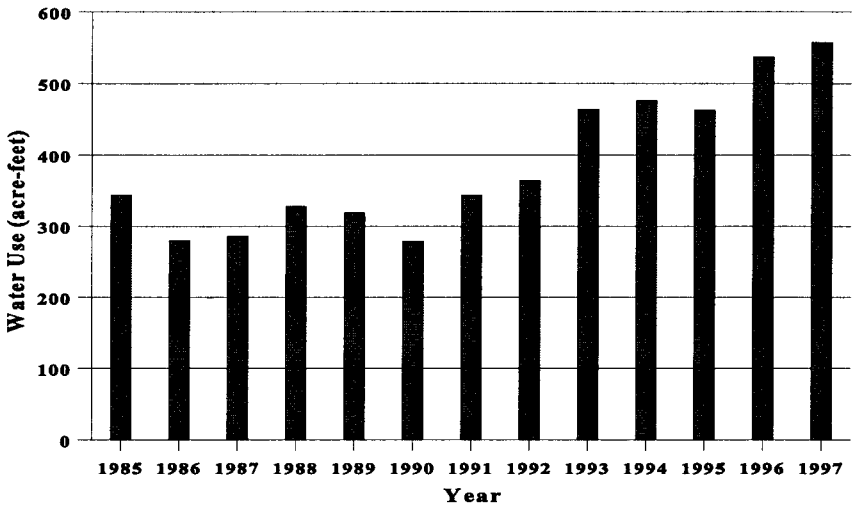


FIGURE 3-8
PRESCOTT VALLEY WATER DISTRICT WATER USE 1985-1997
PRESCOTT ACTIVE MANAGEMENT AREA



The total water use by small municipal providers in 1985 was 344 acre-feet. Water use by these providers amounted to 521 acre-feet in 1997. Figure 3-9 shows water use by small providers for the years 1985 through 1997. Several small providers within the AMA are mobile home parks with very stable populations and virtually no potential for growth. Other small providers serve small subdivisions and are presumed not to expand once buildout occurs. However, some small providers do have potential for growth and have been growing at a steady rate for several years.

FIGURE 3-9
SMALL PROVIDER WATER USE 1985-1997
PRESCOTT ACTIVE MANAGEMENT AREA



Population for small municipal providers was estimated using the average occupancy rate and persons per household figures from the 1990 Census for Yavapai County, even though it is understood that some small providers may be quite seasonal in nature and exhibit much lower occupancy rates and much higher persons per occupied household (ppoh) figures than the average for the county. The number of housing units served by small providers, as reported on the Annual Water Withdrawal and Use Reports, were tallied and the county average occupancy rate and ppoh applied (except for one small provider, Highland Pines, which is known to exhibit a highly seasonal character). The 1992-1995 average GPCD rate for small municipal providers in the Prescott AMA is estimated to have been 104 GPCD. The small provider total GPCD rate has fluctuated over time, with the data showing fairly low GPCD rates in the late 1980s, and increasing GPCD rates in the mid-1990s. It is unclear at this time whether the increasing trend in the small provider GPCD rate will continue, level off, or if GPCD rates will decline eventually.

3.4.1.3 Municipal Water Use Rates

The total per-capita rate for the Prescott AMA, including small municipal providers, increased 24 percent from 1985 to 1997 (from 131 GPCD to 162 GPCD). AMA average GPCD rates have fluctuated from a high of 162 GPCD in 1997 to a low of 123 GPCD in 1987. Calendar year 1996 was a year of extremely low rainfall and somewhat higher than average temperatures in the Prescott AMA.

3.4.2 Municipal Supply

Groundwater made up 94 percent of the total municipal deliveries in 1997. The municipal sector is currently dependent upon groundwater to meet almost all of the demand. The only other source of water currently in use is effluent, used directly for turf watering at two golf courses. The City of Prescott has

been recharging effluent into an artificial recharge facility since 1988 (see Chapter 8). The City can recover the credits accrued from effluent it has recharged since 1994, using its Recovery Well Permit issued by the Department. The City is able to withdraw water from the recovery well and use its recharge credits to serve municipal demand. Although the physical composition of the recovered water withdrawn would be the same as local groundwater, the water would legally be deemed to be effluent. Effluent does not count in the calculation of compliance with municipal provider conservation requirements if it qualifies as excluded effluent (see Chapter 5).

TABLE 3-7
GALLONS PER CAPITA PER DAY TRENDS
PRESCOTT ACTIVE MANAGEMENT AREA*

Year	Prescott	Prescott Valley	Small	AMA	Demand (acre-feet)	% AMA
1985	140	93	165	131	5,323	28%
1986	120	100	132	116	4,929	33%
1987	129	105	122	123	5,526	39%
1988	157	115	129	144	6,771	49%
1989	170	115	118	152	7,556	49%
1990	153	123	98	141	7,088	52%
1991	156	120	118	143	7,410	53%
1992	149	125	123	140	7,439	60%
1993	162	129	138	150	8,329	54%
1994	158	135	143	151	8,764	57%
1995	154	141	120	147	9,136	61%
1996	170	151	142	161	10,328	58%
1997	170	141	140	162	10,383	60%
92-95 Avg.	*155*	*133*	*104*	*146*	*8,345*	

*This table includes groundwater use only. Exempt wells are not included.

3.4.3 Municipal Growth Trends

Municipal water demand is very closely tied to population increases. Although water use per capita fluctuates within a service area over time depending on a number of factors (see Chapter 5), added population almost always results in an increase in total water demand. For more information on growth trends and projections, see Chapter 11.

3.4.3.1 Past Municipal Demand

The population in the Prescott AMA is estimated by the Department to have been about 44,000 in 1985. This figure includes population served by large municipal providers and small municipal providers, as well as population using small, private, domestic wells (exempt wells) to meet demand. Population served via exempt wells is estimated by the Department to have been less than 8,000 people in 1985.

In 1985, municipal groundwater use accounted for 29 percent of the total groundwater use in the Prescott AMA. Table 3-8 illustrates the Prescott AMA population served by municipal providers, the associated water use, and GPCD rates for the years 1985, 1990, 1995, and 1997. Groundwater served all of this demand, except for the demand associated with some turf-related facilities served by the City of Prescott, which were supplied with treated effluent for direct use. Estimated water use associated with exempt wells, as well as exempt well population, are not included in this table.

TABLE 3-8
MUNICIPAL WATER PROVIDERS WATER USE AND POPULATION
1985, 1990, 1995, AND 1997
PRESCOTT ACTIVE MANAGEMENT AREA

Year	Population	Total Use (acre-feet)	Total GPCD
1985	36,391	5,323	131
1990	44,868	7,088	141
1995	55,434	9,136	147
1997	57,288	10,383	162

3.4.3.2 Current Municipal Demand

By 1995, the total population residing within the Prescott AMA had increased to about 67,000 people, including population served by municipal water providers as well as population using private, individual wells. This is an increase of almost 23,000 people in ten years and correlates to about a 5 percent per year rate of growth. Population supplied by exempt wells is estimated by the Department to have been about 11,500 people in 1995. This is an increase of almost 4,000 people and closely matches the AMA-wide growth rate of about 5 percent per year.

In 1997, municipal groundwater use accounted for 63 percent of the total groundwater use in the Prescott AMA. Municipal demand was still fully dependent on groundwater in 1997, with the sole exception of those municipally served turf-related facilities who utilized effluent for turf watering.

As additional agricultural lands are urbanized during the third management period and municipal growth continues, municipal groundwater use will make up a larger and larger share of the total groundwater use in the Prescott AMA. Moreover, groundwater demand is increasing at a greater rate than the population. While the AMA municipal provider-served population increased 57 percent from 1985 to 1997, use of groundwater by municipal providers has increased 96 percent. Part of the reason why groundwater demand has increased at a greater rate than population growth is that the overall municipal provider per capita use rate in the Prescott AMA has been increasing over time, as shown in Table 3-8. Exempt well water use, which is not tracked, is assumed to have increased with increased population supplied by these wells. The Department has no data on rate of use trends for population served by exempt wells. Groundwater is still the primary water supply for municipal users because it is the least expensive source of water in the AMA.

Overall water use patterns in the Prescott AMA have not changed considerably since the first management period. Population and total water use are steadily increasing and per capita consumption is at higher levels than was targeted for the end of the second management period.

3.4.4 General Issues in the Municipal Sector

Major water management issues facing the municipal sector during the third management period include transitioning from groundwater to other supply sources, the impact of exempt well withdrawals on groundwater availability, and the reliability of these wells in upland areas of the AMA. Increasing non-residential per capita rates within water service areas and the effect of this on municipal provider compliance and supply availability, and the ability of providers to obtain non-AMA groundwater from the Big Chino Subbasin, outside the AMA, are also issues for the municipal sector. However, all of the issues are tied to groundwater mining in the Prescott AMA, relative to the implementation of the Department's Assured Water Supply Rules (AWS Rules). More information on how these issues are addressed in projections of future demands and supplies can be found in Chapter 11.

3.4.4.1 Assured Water Supply Rule Impacts and Declaration of Groundwater Mining

In 1995, the Department adopted the Assured and Adequate Water Supply Rules, primarily to reinforce the Code criteria pertaining to the achievement of AMA management goals. An assured water supply can be demonstrated in two ways: (1) a developer can obtain a Certificate of Assured Water Supply (Certificate of AWS) for a development or (2) the developer may locate the proposed development within the service area of a municipality or private water company that has a Designation of Assured Water Supply (Designation of AWS). Developers may not offer subdivided land for sale or lease until one of these two conditions has been met. A subdivision for this purpose is defined as land divided into six or more parcels where at least one parcel is less than 36 acres. Larger land divisions do not require an assured water supply determination. A developer or municipal provider located within an AMA must meet certain criteria for receiving either a Certificate or Designation. In order to meet these criteria, subdivisions, including dry-lot subdivisions over 50 lots, and municipal providers must demonstrate all of the following:

1. Physical, legal, and continuous water availability for a 100-year period
2. Satisfaction of existing state water quality standards
3. Demonstrated financial capacity to construct the necessary infrastructure
4. Consistency with the AMA management goal prescribed by statute
5. Consistency with the AMA management plan

Dry-lot subdivisions of less than 50 lots, but more than 20 lots, must only meet requirements 1 through 4 above. Dry-lot subdivisions of 20 lots or fewer are only required to meet 1 through 3 above.

To be "consistent with the management goal of an AMA," new municipal users must limit the use of mined groundwater and instead use renewable supplies. Undesignated water providers will be allowed to continue mining groundwater to serve their existing customers, while new subdivisions will be required to get a Certificate of AWS.

A minimal amount of groundwater is allocated to most certificates or designations, although this "groundwater allowance credit" methodology differs between each AMA and is intended to allow for the "phasing in" of renewable supplies over time. Any water demands in excess of these groundwater allowance credits must be met with renewable supplies. Groundwater may also be withdrawn over and above the amount allocated under the AWS Rules in the following circumstances: (1) groundwater withdrawn pursuant to extinguishment credits issued for retiring grandfathered groundwater rights; and (2) poor quality groundwater, water withdrawn from waterlogged areas, and any groundwater withdrawn under surface water drought conditions. A Certificate or designation may be modified to include new demand and supply scenarios. In this event, a public notice must be issued.

At the time the AWS Rules were developed, the hydrologic data necessary to determine if the Prescott AMA is in safe-yield were not considered adequate to apply the assured water supply consistency with the

management goal criteria to the AMA. As a consequence, consistency with the management goal criteria are only effective in the Prescott AMA under groundwater mining conditions. Instead, a water monitoring program was designed and constructed to accumulate the information necessary to determine when groundwater mining is occurring. Accordingly, three successive periods of measurements indicating the presence of groundwater mining under normalized conditions must occur before the AMA can be considered to be in a state of groundwater mining.

On August 28, 1998, the director of the Department made a preliminary determination that the Prescott AMA is not at safe-yield and is in an overdraft condition. This determination was based on data collected by the Department that demonstrated ongoing water level declines and current groundwater pumping greatly in excess of the AMA's safe-yield goal. In the last five years, water levels in the Prescott AMA have declined in more than 73 percent of monitored wells. In longer-term periods, similar decline trends have been measured. In fact, the data demonstrate that the Prescott AMA has been out of safe-yield since at least 1990. After considering public comment and an independent evaluation of the Department's hydrologic studies, the Department made a final determination on January 12, 1999 that the Prescott AMA is not at safe-yield.

3.4.4.2 Big Chino Groundwater Importation

Municipal water providers within the Prescott AMA recognize the importance of the potential water supply in the Big Chino Subbasin. However, the ability of the water providers to obtain, transport, and ultimately serve Big Chino groundwater to their customers presents several problems for local entities, including capital improvement costs, distribution system design, construction and maintenance, and legal circumstances. As currently written, the statute allowing importation of this supply is limited to municipalities. Of those municipalities, only the City of Prescott can withdraw groundwater from the Big Chino Subbasin without first retiring Big Chino farmland from any future use. Big Chino groundwater will not be used in the Prescott AMA before groundwater mining occurs. This is because it is only under conditions of groundwater mining that an entity would be required to demonstrate consistency with the Prescott AMA goal through the use of renewable supplies or groundwater withdrawn from outside the AMA. Demonstration of a commitment to import Big Chino groundwater would help a water provider prove consistency with the AMA goal when applying for an assured water supply designation. In addition, quantification of the volume of water that can be taken from the Big Chino Subbasin needs to be made before this could be considered a viable source of supply for the Prescott AMA.

3.4.4.3 Other Municipal Supply Issues

Effluent is the most abundant, readily available, and reliable renewable supply available to water users within the Prescott AMA. To the extent that effluent can be artificially recharged, groundwater pumpage can be offset. However, due to the mountainous terrain and physical stream drainage geography within the Prescott AMA, locating additional sites where artificial recharge can benefit the AMA's aquifers is a challenge. The Department is available to assist any and all water users within the Prescott AMA who are planning to pursue the development, construction, and operation of an artificial recharge facility within the Prescott AMA. This source of supply is an asset to the AMA's water users that should not be lost from the AMA if at all possible.

3.4.4.4 Exempt wells

In 1995, there were about 11,500 people living in the Prescott AMA whose sole source of water was exempt wells. Groundwater withdrawals from exempt wells in the Prescott AMA could be anywhere from about 1,100 to 2,700 acre-feet of water per year. This pumpage is not required to be reported to the Department. By the year 1995, there were over 7,100 exempt wells in the Prescott AMA. Many of these wells are drilled in the foothills of the mountains surrounding the AMA, where up-scale custom-lot

subdivisions draw buyers based on the spectacular views and rugged terrain. Unfortunately, many of these lots are underlain by hardrock, with a limited and uncertain water supply. As exempt well or "dry-lot" subdivisions continue to be offered for sale in the Prescott AMA, the likelihood of existing exempt wells in these locations going dry will increase.

Other exempt wells, located in lower elevation areas and in proximity to agricultural lands may also be susceptible to lowered water levels as agricultural lands go out of production and incidental recharge from agricultural irrigation decreases. The development of a central distribution system to serve exempt well owners in these areas is a possibility for the future. The Department has limited regulatory authority to restrict dry-lot subdivisions where there is a lack of sufficient groundwater available. The Department has no authority to require exempt well owners to report their annual groundwater withdrawals or report any other information regarding per capita use rate consumption. If the Prescott AMA community perceives dry-lot subdivisions to be a factor inhibiting the achievement of the AMA goal in the future, additional Departmental authority, or local community involvement and regulation, must be sought. Figure 3-10 displays the geographic concentrations of exempt wells throughout the Prescott AMA.

3.4.4.5 Non-Residential GPCD Issue

While the City of Prescott's non-residential GPCD rate has been very stable over the last ten years or more, the Prescott Valley Water District's non-residential GPCD rate has been steadily increasing. This has had the impact of increasing the overall GPCD rate within the Prescott Valley Water District water service area. If this continues, the Prescott Valley Water District may be in danger of exceeding its water conservation requirement under the Total GPCD Program. There are two alternative programs available to large municipal water providers who are experiencing increasing non-residential per capita rates: the ACP and the NPCCP (see Chapter 5). If the Prescott Valley Water District fulfills the entrance requirements into either of these two alternative programs, the Prescott Valley Water District can continue to grow non-residentially and still be in compliance with its conservation requirement. However, both of these alternative programs contain groundwater use limitation requirements that must be met to qualify for the program. To the extent that the Prescott Valley Water District is able to meet those limitation requirements, the district could qualify for one or the other of the two alternative programs.

3.5 INDUSTRIAL

Industrial demand consists of non-irrigation uses that are met by individually owned, non-irrigation grandfathered rights, or groundwater withdrawal permits. Industrial users are not served by a city, town, or private water company, but own their own wells and water rights. Industrial uses fall into nine different categories and include uses such as landscape watering within school grounds and golf courses, and withdrawals of groundwater associated with the processing of sand and gravel materials for landscaping and construction purposes.

3.5.1 Industrial Demand

Industrial water use in the Prescott AMA totaled 626 acre-feet in 1997. Most of this use occurred in the Upper Agua Fria Subbasin. This accounted for about 3 percent of the total AMA water use in 1997 and about 3 percent of the total groundwater use in the Prescott AMA for 1997. Industrial users in the Prescott AMA include two golf courses, two schools, one sand and gravel facility, one shopping center, and one construction company, as well as various small water users, who obtain water from their own wells and hold their own water rights. There are presently six turf-related facilities in the Prescott AMA. Two of these are schools. The rest are golf courses, each of which averages about 500 acre-feet of water use annually. The Prescott Country Club, The Villages at Lynx Creek, and Quailwood Greens each use groundwater for turf watering. In addition to these three turf-related facilities, Antelope Hills, which consists of two 18-hole golf courses, is using 100 percent effluent supplied by the City of Prescott.

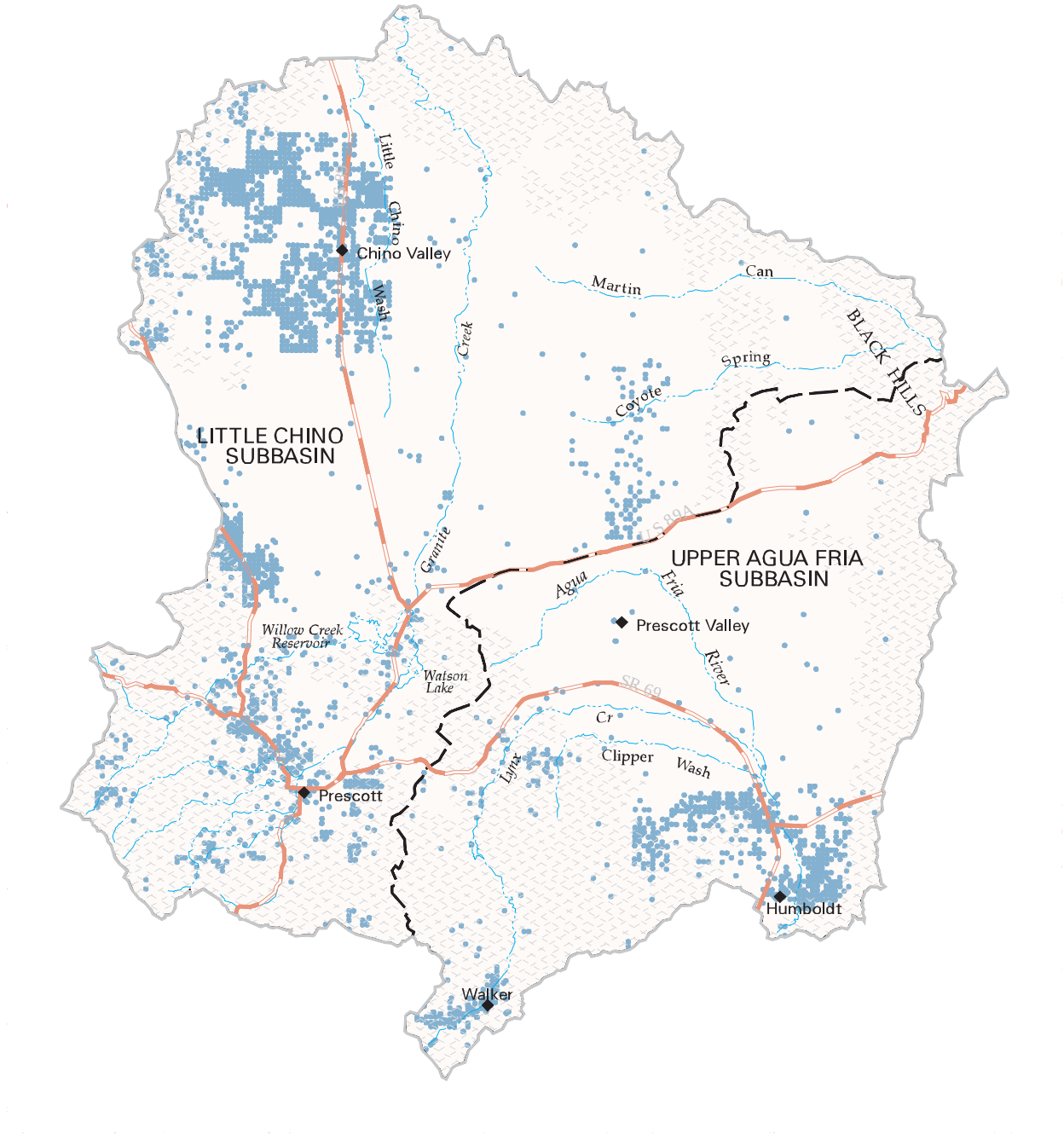


Figure 3- 10

Exempt Wells

SOURCE:
Arizona Department of Water Resources
Geographic Information System

3.5.2 Industrial Supply

Industrial users in the Prescott AMA use only groundwater to meet their water needs. Industrial users currently use less water than they are entitled to use pursuant to their grandfathered water right or permit allotments. The actual allotment associated with the industrial sector is approximately 5,035 acre-feet per year, which includes a Type 2 non-irrigation grandfathered right owned by the City of Prescott with an allocation of more than 3,000 acre-feet per year. The difference between the allotment volume and actual use is partially explained by the process used to establish grandfathered water rights. Type 2 non-irrigation grandfathered right allotments for industrial users were based on the highest pumpage year between 1975 and 1980. Industrial water use is associated with production levels which in some cases were high during this period and which can fluctuate widely in response to varying economic conditions. In addition, some industrial users have ceased operations entirely, although they have retained their water rights.

3.5.3 Industrial Demand Trends

Industrial demand generally mirrors municipal demand. As new subdivisions are built, new schools and golf courses are constructed, which may be served from privately owned wells through non-irrigation groundwater rights or permits. However, a prudent water management approach would encourage the use of effluent to serve the water demand at new industrial facilities to the extent feasible. See Chapter 11 for more information on projected demands in the industrial sector.

3.5.3.1 Past Industrial Demand

Based on reported water use, industrial use was about 77 acre-feet in 1985. This small use represented only 0.5 percent of the total AMA water use in that year and only 0.6 percent of the total AMA groundwater use. Golf courses and schools were the primary industrial water users in 1985.

3.5.3.2 Current Industrial Demand

By 1997, industrial water use had increased to 626 acre-feet. The Prescott AMA has had a problem with some industrial facilities failing to file annual reports with the Department, and this could explain some of the tremendous jump in water use from 1985 to 1997. Most of the 1997 use was associated with turf-related facilities (golf courses and schools) in the Prescott AMA.

Table 3-9 shows the number of industrial facilities by category, associated water rights and permits, and the volume of water used in 1997. Table 3-10 shows current industrial water use in 1985 and 1992 through 1997 as reported to the Department.

3.5.4 Large Unused Allotment Issue

There is a large volume of unused allotment associated with the industrial sector. Rights and permits held by industrial users total nearly 5,250 acre-feet, including the City of Prescott's large Type 2 right. While some of the unused allotment may never actually be put to use, it is not possible to predict future utilization. Type 1 rights and some Type 2 rights may be extinguished for assured water supply credits (mineral extraction and electric power Type 2 rights may not be extinguished for this purpose). The Department also has the authority, beginning in the year 2006, to implement a program to purchase and retire grandfathered rights. However, it is unlikely that the Department will implement this provision during the third management period. Both mechanisms provide opportunities to permanently extinguish existing industrial rights. The unused allotments associated with non-irrigation grandfathered groundwater rights represents an authority to increase groundwater withdrawals for industrial purposes. However, if industrial water use increases to a volume close to the full allotment of industrial water rights (5,250 acre-

feet), the Prescott AMA would be moved that much further away from the achievement of its safe-yield goal by the year 2025.

3.6 ISSUES AFFECTING MULTIPLE SECTORS

The Prescott AMA is currently in a state of flux. A steady, strong rate of growth over the last ten years or more has increased awareness of water management issues within the Prescott AMA community. Years of dry weather have brought to the surface concerns for the long-term reliability of the water supply in the Prescott AMA, which does not have access to some of the renewable supplies enjoyed by larger AMAs, such as Central Arizona Project water and large surface water reservoirs. Bigger picture issues currently being faced in the Prescott AMA are briefly described below.

3.6.1 Urbanization Issues

The full implementation of the AWS Rules in the Prescott AMA will affect the manner in which development occurs within the AMA. A more regional approach to water management, along with a keen awareness of efficiency of use, will be required to maintain growth and quality of life within the Prescott AMA, just as in other AMA's with a safe-yield goal. Chapter 11 of this plan outlines the assumptions the Department has used in projecting the impacts of a condition of groundwater mining in the year 1998 on growth and development within the Prescott AMA.

TABLE 3-9
INDUSTRIAL GROUNDWATER RIGHTS AND WITHDRAWAL SUMMARY-1996
PRESCOTT ACTIVE MANAGEMENT AREA

User Category	Type Of Right	Number Of Facilities	Right Allotment (acre-feet)	1997 Use (acre-feet)
Sand and Gravel	Mineral Extraction	1	68.6	2.7
School	General Industrial Use Permit	1	18	38.9[1]
School	General Industrial Use Permit	1	33.2	87.5[1]
Shopping Center	General Industrial Use Permit	1	12	12
Construction	General Industrial Use Permit	1	5	5
Various	Type 1	1	45.6	16.4
Turf	Type 2	1	469	434.1
Various	Type 2	6	136.4	29
TOTAL			787.8	626

[1] The schools have consistently exceeded their allotments of groundwater in recent years. In response to local concerns, the Department is working with these entities in an attempt to resolve the matter in the scope of overall water management efforts for the Prescott AMA.

TABLE 3-10
INDUSTRIAL WATER DEMAND FROM 1985 AND 1992-1997
PRESCOTT ACTIVE MANAGEMENT AREA

	1985	1992	1993	1994	1995	1996	1997
Volume of Total Industrial Water Use in Acre-Feet	77	443	500	533	555	688	626
Industrial Water Use as a Proportion of Total AMA Water Use	0.5%	3%	3%	3%	3%	3%	3%
Industrial Water Use as a Proportion of Total AMA Groundwater Use	0.6%	3%	3%	3%	3%	4%	3%

3.6.2 Indian Water Use Trends

The Yavapai-Prescott Indian Tribe receives water from the City of Prescott for residential and commercial use. Although its population is relatively small, the presence of a resort and casino operation results in a high volume of commercial water consumption in relation to the Tribe's size. The Tribe also holds surface water rights, the use of which could impact overall water availability.

3.7 CURRENT WATER BUDGET

The water budget in Table 3-11 contains information on water use within each demand sector for the years 1990 through 1997, as well as hydrologic components that were described in Chapter 2. This water budget is reflective of actual conditions in those years, except where annual factors are based on long-term, normalized data (i.e. natural recharge). Major hydrologic events, such as floods if any occurred, are separated out and factored in as they were recorded in each year for this budget.

The budget shows that the Prescott AMA is currently not at safe-yield. Moreover, the budget displays a consistent trend of groundwater demands exceeding recharge. Although this imbalance varies significantly from year to year and even shows a surplus year, there is a persistent level of overdraft present throughout the time period displayed.

3.8 CONCLUSIONS

As agricultural activity declines and domestic wells are threatened with closure due to water level drawdowns, the movement toward centralization and regionalization of municipal water distribution will continue. Municipal water users are already starting to seriously address the need to utilize greater quantities of renewable water or imported groundwater. The impetus to put effluent to use directly or through permitted underground storage and recovery projects is also increasing. However, there are still locations within the Prescott AMA which are either isolated from renewable water sources or lack the infrastructure to retrieve them. Ultimately, the Prescott AMA must move toward a regional water management approach aimed at using renewable water (surface water, effluent, imported groundwater) to support development evenly and continuously throughout the Prescott AMA.

The water demand characteristics described above, including sources of supply utilized, coupled with anticipated growth rates projected to continue throughout the third management period and beyond, illustrate that additional water conservation and augmentation programs are necessary in order to achieve

the AMA goal by 2025. Furthermore, the water budget shown above gives an indication of just how much more effort is needed to achieve the goal.

The Third Management Plan programs that follow were developed within current statutory guidelines. However, as described in Chapters 8 and 10, even full implementation and complete compliance with the conservation requirements outlined in chapters 4, 5, and 6 will probably not result in the achievement of the AMA goal by the year 2025. The community of the Prescott AMA is facing the challenge of developing and putting into place a water management strategy that recognizes the need for additional water augmentation activities and more effective water conservation programs in order to ensure the continued economic viability of the AMA into the future. This situation is further discussed in Chapter 12.

The Third Management Plan represents the middle step in a series of five management plans designed to achieve the AMA goal. However, the third management period will be a turning point in water management that has previously been unrealized. The provisions of the Code, as it currently stands, are being reexamined to determine if improvements can be made to protect and preserve the water supply of the Prescott AMA for as long as possible and to encourage a high level of efficiency of use as well as the use of additional renewable water supplies.

TABLE 3-11
1990-1997 HISTORICAL WATER BUDGET (IN ACRE-FEET)
PRESCOTT ACTIVE MANAGEMENT AREA

	1990	1991	1992	1993	1994	1995	1996	1997
DEMAND								
MUNICIPAL DEMAND	**8633**	**9379**	**9406**	**10372**	**10745**	**11091**	**12571**	**12366**
City of Prescott	5358	5933	5706	6410	6357	6452	7288	7281
Effluent Direct Use	344	712	650	777	701	788	936	772
Groundwater	5014	5221	5056	5633	5656	5664	6352	6509
Prescott Valley Water District-Grdwater	1795	1854	2019	2232	2615	3010	3439	3353
Small Provider-Grdwater	279	335	364	464	493	463	537	521
Exempt Wells-Grdwater[1]	1201	1257	1317	1266	1280	1166	1307	1211
AGRICULTURAL DEMAND	**6932**	**9391**	**7790**	**10198**	**7834**	**8915**	**7959**	**7795**
Groundwater	6032	5943	4613	6460	6134	5316	6629	6260
CVID Surface Water	0	2548	2277	2532	673	2548	327	484
CVID Effluent	0	0	0	306	127	151	103	151
Other Surface Water	900	900	900	900	900	900	900	900
INDUSTRIAL DEMAND	**444**	**486**	**443**	**500**	**533**	**555**	**688**	**626**
Turf Facilities-Groundwater	349	399	313	343	357	391	502	434
Non-Turf Facilities-Groundwater	95	87	130	157	176	164	186	192
NATURAL SYSTEM DISCHARGES	**4850**	**4850**	**4850**	**4850**	**4850**	**4850**	**4850**	**4850**
Del Rio Springs Underflow from AMA	1500	1500	1500	1500	1500	1500	1500	1500
Del Rio Springs Grdwater Discharge	2100	2100	2100	2100	2100	2100	2100	2100
Upper Agua Fria Baseflow from AMA	1250	1250	1250	1250	1250	1250	1250	1250
RENEWABLE SUPPLIES								
NON-GROUNDWATER SUPPLIES	**1244**	**4160**	**3827**	**4515**	**2401**	**4387**	**2266**	**2307**
Surface Water	900	3448	3177	3432	1573	3448	1227	1384
Effluent	344	712	650	1083	828	939	1039	923
INCIDENTAL RECHARGE	**4938**	**8488**	**8000**	**9245**	**4518**	**7199**	**5015**	**5323**
Agricultural Incidental Recharge	2773	3756	3116	4079	3134	3566	3184	3118
CVID Canal Losses	0	2548	2277	2838	800	2699	430	635
Industrial Incidental Recharge	35	56	48	56	53	59	72	60
Effluent Discharged into Agua Fria	0	0	0	0	531	875	1329	1510
Effluent Recharged with No Credits	2131	2128	2559	2272	0	0	0	0
NATURAL SYSTEM RECHARGE	**4600**	**4600**	**4600**	**23320**	**4600**	**8920**	**4600**	**4600**
Upper Agua Fria Natural Recharge	2550	2550	2550	2550	2550	2550	2550	2550
Little Chino Natural Recharge	2050	2050	2050	2050	2050	2050	2050	2050
Granite Creek Flood Recharge	0	0	0	18720	0	4320	0	0
CHANGE IN STORAGE								
TOTAL DEMAND	20859	24106	22489	25920	23962	25411	26068	25637
TOTAL RENEWABLE SUPPLY	10782	17248	16427	37080	11519	20506	11881	12230
TOTAL GROUNDWATER OVERDRAFT	**-10077**	**- 6858**	**- 6062**	**11160**	**- 12444**	**- 4905**	**-14188**	**-13407**
City of Prescott Effluent Recharge Credits	0	0	0	0	1940	2098	1688	2270
CHANGE IN WATER STORAGE	**-10077**	**- 6858**	**- 6062**	**11160**	**- 10504**	**- 2807**	**- 12500**	**- 11137**

[1] Exempt well water use is based on exempt well population as it is determined using ADES 1990 and 1997 population and large and small provider population for the Prescott AMA. Fluctuations in exempt well water use correlate to fluctuations in provider population.